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Investments in global water infrastructure

An analysis of the global and European water markets

Customer version | Swiss edition

Preface

Water is essential for all forms of life. In many places, water-intensive agriculture overexploits groundwater resources, although it is essential for food security. The growing demand for water is increasingly leading to water scarcity due to overuse, while at the same time water quality is deteriorating due to a variety of pollutants. Although these problems are regional in nature, taken as a whole, there is a global water crisis, primarily caused by direct human intervention in the water cycle, but exacerbated by advancing climate change. Global warming increases uneven water distribution. Humid areas become more humid, dry areas become drier. Droughts and floods are becoming more frequent and extreme, and they can even occur in the same place in short succession. The global water crisis with its diverse regional characteristics requires innovative solutions in various areas. These include intelligent, economical irrigation systems, preventive flood protection, efficient water treatment and wastewater recycling. There is no doubt that the water sector is an exciting field for sustainable investments.

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Regions analysed:	Global
Sectors:	Industry, utilities, technology
Sustainable Development Goals (SDGs):	03 Health and well-being | 06 Clean water and sanitation | 09 Industry, innovation and infrastructure | 11 Sustainable cities and communities | 14 Life below water | 15 Life on land
Date of publication:	November 2023

Summary

Increasing prosperity combined with a growing world population is raising water consumption. However, the freshwater resources (groundwater and surface water) available globally are limited. Climate change is also jeopardising the amount of usable water that is available. As a result, this "water gap" threatens to become ever larger. On the one hand, this analysis identifies the primary causes of this water gap and addresses specific solutions. On the other hand, it also shows which sectors are attractive for potential investments.

Sustainable freshwater is becoming increasingly scarce – the main reasons:

– Rising prosperity around the world and population growth are increasing water demand by around one percent per year.
– Climate change is leading to substantial changes in the local supply of surface water (extreme weather events, altered precipitation patterns, etc.).
– Water protection is facing new challenges due to large-scale contamination caused by "forever chemicals".
– Groundwater is not an equivalent alternative to surface water, which at best remains constant, as it replenishes itself much more slowly on average (depending on local conditions).
– There is no substitute for sustainably usable freshwater, which is why a robust water infrastructure is essential for survival.

The water sector offers interesting investment opportunities. The reasons for this are the following:

– There have been no fundamental disruptive developments in the water sector so far, and the quality of water companies (attractive returns on capital and strong balance sheet) is usually high. This gives the sector a defensive character.
– Overall, the water sector is characterised by average annual growth of around four to six percent, which is significantly above the long-term global average economic growth of two to three percent.
– Agriculture has the greatest potential for increasing water efficiency through the use of resource-conserving water technologies. It consumes by far the most freshwater.
– Companies from the water value chain are usually traded with a markup compared to the general market due to their solid market position and high entry barriers.

1 Climate change threatens water supply

According to estimates by the United Nations (UN), up to 2.4 billion people or 30 percent of the world's population live in regions with constant or temporary water shortages. By 2050, this number is expected to rise to around six billion people.[1] Due to increasing prosperity, the global demand for freshwater has been rising continuously and disproportionately to population growth for decades. According to the UN, demand has increased by around one percent per year since 1980. The drivers of freshwater consumption include: industry, agriculture and households. The structural demand growth for freshwater is combined with fundamental changes in water supply.

1.1 Climate change strongly influences the supply of surface water

To meet global demand for freshwater, a reliable and constant supply of water is essential. Although this is currently still secure in Europe, it is increasingly at risk due to climate change. Extreme weather events, melting glaciers and changing precipitation patterns as a result of climate change are directly leading to the water supply becoming increasingly restricted and unpredictable. The globally dry summer of 2022 is an example of such extreme weather conditions, which brought with it severe challenges for the population. Heatwaves combined with prolonged drought resulted in record-low levels in European waters. This had a dramatic impact on agriculture. The Spanish region of Almería, one of the most important European regions for growing vegetables and fruit, was particularly affected. The drought led to distribution problems for water, harvest failures as well as high financial losses. In anticipation of an equally dry summer in 2023 and to cushion the consequences of the previous year, the Spanish government adopted an agricultural rescue package worth over two billion euros in June 2023.[2]

Northern Italy also experienced substantial crop failures due to heat-related water shortages in the summer of 2022. The low water levels in lakes and reservoirs in the Italian Po basin were especially alarming. Due to the scarcity of surface water and the overuse of groundwater, salty seawater was able to penetrate underground into the Po delta, which resulted in the salination of cultivated areas in some places. Combined with the extreme drought, the outcome led to crop failures estimated at around six billion euros.[3]

[1] SDG Indicators (un.org)
[2] NZZ-Magazin, 10.6.2023
[3] Hitzewelle und Dürre in Norditalien im Klimawandel: Abschied vom Überfluss – WELT

Drought in the Po basin

Flooding follows drought
Warm air can absorb more moisture than cold air. This is why hot and dry periods are often followed by prolonged heavy rain. Due to the dried-out soil, heavy rainfall cannot be sufficiently absorbed, which often leads to flooding. The Italian region of Emilia Romagna, for example, was heavily affected by this in May 2023. After a hot summer last year and months of winter drought with relatively warm temperatures, the long-awaited precipitation followed with such intensity that within a few hours the same amount of water fell as is normally expected over several months. The floods had a devastating impact on the local population and agriculture. A total of 15 people died, approx. 2,000 people had to be evacuated. The damage was estimated at over two billion euros.[4] The disaster also had long-term consequences for the important fruit crops in the low-lying regions of Emilia Romagna. The soils there became too damp, which led to fruit trees slowly dying.

The probability of being affected by this kind of flooding is steadily increasing worldwide. According to a recent study, the number of people at risk of flooding is already around 23 percent of the world's population. This figure is expected to increase further in the coming decades due to advancing climate change.[5] Forecasts indicate that western Europe will also be increasingly affected by extreme fluctuations in the volume of precipitation.

The increasing summer heatwaves are also having a negative impact on Swiss waters. In lakes, disproportionate surface heating sometimes causes water circulation to stop, which prevents an even distribution of oxygen in the water. This promotes fish mortality rates, the spread of diseases and the proliferation of invasive organisms. Prolonged heavy precipitation is leading to increased flooding and mud flows, especially in the mountain regions. Rising temperatures in the higher lying areas of the country are accelerating the pace of snowmelt. According to the Swiss Weather Service, in 2023 there was less snow at around 40 percent of the measurement sites in Switzerland above 1,000 metres than in the past 70 years. The lack of snow in winter is a precursor to even more drought in summer, as the snow cover serves as an important precipitation reservoir. To put it concisely: the supply of surface water is changing greatly due to climate change. At the same time, this change in supply is affecting a growing population that uses more water as prosperity increases. This combination is leading to an exacerbation of the general water supply situation in many areas and forcing more and more people to rely increasingly on a valuable and predictable, but also extremely sensitive water resource: groundwater.

1.2 Groundwater, both sensitive and valuable

Groundwater can generally be used for the same purposes as surface water. However, there are new risks associated with the use of groundwater. For example, overuse during hot summer months can lead to groundwater reservoirs no longer being filled by sufficient inflow in the winter months. This was the case in central Germany, among other places, in the summer of 2022. The water table and the level of the Rhine fell to their lowest level since 1990. This resulted in regional water shortages with direct effects on the economy (e.g. in freight transport on the Rhine) and on the quality of life of the local population.

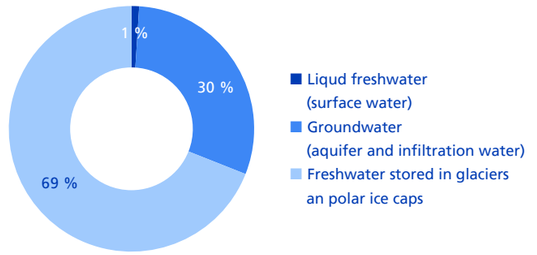
Groundwater plays an essential role in water supply. For instance, around half of the world's population regularly consumes groundwater.[6] In low-precipitation regions, such as areas in southern Europe, groundwater reservoirs are often the only reliable permanent sources of water. Groundwater reserves are spread all over the world. However, the extent of these reserves depends heavily on local precipitation patterns and soil conditions.[6] Regions are supplied with groundwater reserves through aquifers. These are layers of rock that carry groundwater and can store large quantities of water. The size and number of aquifers depend heavily on the geological conditions prevalent in the region.

Another challenge is the threat of groundwater contamination. In the worst case, contamination is irreversible or can often only be removed with considerable time and cost.

Climate change poses an additional risk to the groundwater reservoirs. The sea level is rising steadily as the polar ice caps melt. If this rises above the level of the water table, there is a danger of groundwater reservoirs becoming salinated. Maintaining high groundwater quality is important, as only 2.5 percent of the total water volume is available as fresh water.[7]

Of this amount, 30 percent is groundwater in the form of infiltration and aquifer water. 69 percent of all freshwater is stored in the polar ice caps and glaciers. Only around one percent of the global freshwater reserves are accessible to the global population in the form of liquid surface water (see Figure 1).

Figure 1: Global freshwater reserves



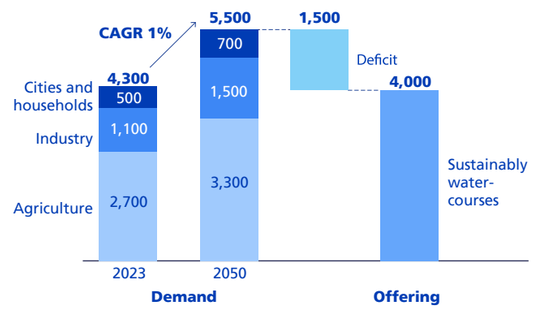
Source: Federal Institute for Geosciences and Natural Resources (BGR)

On average globally, agriculture is the largest user of groundwater, followed by households. The smallest user group is industry. This is why agriculture plays a key role in closing the "water gap".

1.3 The challenge of the "water gap"

Globally speaking, sustainable surface water is already being overused today due to population growth and increasing prosperity. The groundwater can temporarily compensate for part of the lack of surface water, but usually not permanently, because groundwater, as described above, replenishes much more slowly than surface water. Moreover, the problem does not affect all groundwater reservoirs to the same extent, as the speed and inflow quantities can vary greatly depending on precipitation and geological conditions. In principle, only as much groundwater should be extracted locally as is sustainably replenished. Climate change further exacerbates the problem, since the supply of locally available freshwater (surface and groundwater) is changing significantly. This imbalance between water demand and supply is therefore referred to as the "water gap" (see Figure 2).

Figure 2: The global water gap in km³, distributed across 154 basins worldwide



Source: Zürcher Kantonalbank, UN World Water Development Report 2023, Water Resources Group 2009

Agriculture is primarily responsible for the overuse of sustainably available surface and groundwater reserves. At the same time, this is also the industry that suffers the most losses in the event of water shortages. If groundwater reserves continue to be overused, they are at risk of total depletion in extreme cases, which is an irreversible process and can jeopardise the water supply of entire regions. Overuse of groundwater not only has a negative impact on water availability, but also on water quality. Lower water levels inevitably increase the concentration of existing pollutants and chemicals. This can lead to hazardous threshold values being exceeded, resulting in additional costs for water treatment. Possible solutions to both the water problem in agriculture and the protection of water resources are examined in detail in the following sections.

[4] Italien nach der grossen Flut – Eine vermeidbare Katastrophe? | ARTE
[5] Flood exposure and poverty in 188 countries | Nature Communications
[6] UN World Water Development Report 2022 | UN-Water (unwater.org)
[7] UN World Water Development Report 2022 | UN-Water (unwater.org)

What role does water play in the UN's Sustainable Development Goals (SDGs)?
The water gap represents the challenges under the following UN Sustainable Development Goals (SDGs):

SDG 3
Good health and well-being
Reduction of deaths and illnesses due to hazardous water pollution and contamination.

SDG 6
Clean water and sanitation
Stable and hygienic access to freshwater is a basic requirement for ensuring and maintaining the human right to hygiene.

SDG 9
Industry, innovation and infrastructure
Investments in water infrastructure form the basis for economic growth and promote prosperity. Water infrastructure also forms the basis for the freshwater supply and is therefore also a prerequisite for achieving SDG 9.

SDG 11
Sustainable cities and communities
To ensure a life worth living in urbanised regions, it is important to protect against extreme weather events as a result of climate change. This includes the construction of flood-proof infrastructure.

SDG 14
Life below water
Efficient and comprehensive wastewater treatment supports the conservation of marine and aquatic habitats.

SDG 15
Life on land
A functioning water infrastructure contributes to the conservation and sustainable use of freshwater ecosystems, counteracts desertification and also promotes the conservation of biodiversity.

The OECD estimates that nearly 6.7 trillion US dollars in investments in water infrastructure will be required by 2030 to achieve SDG 6 (Clean water and sanitation) alone.[8] However, 80 percent of the countries that have committed to the SDGs are still far from achieving these investment goals, according to their own statements.

The global community has made some progress. However, global efforts in regulation (e.g. water quality regulations) and investments (e.g. replacement of lead water pipes or smart irrigation systems) will still have to increase significantly in the coming years.

[8] OECD Policy Paper 2018: Financing Water. Investing in Sustainable Growth

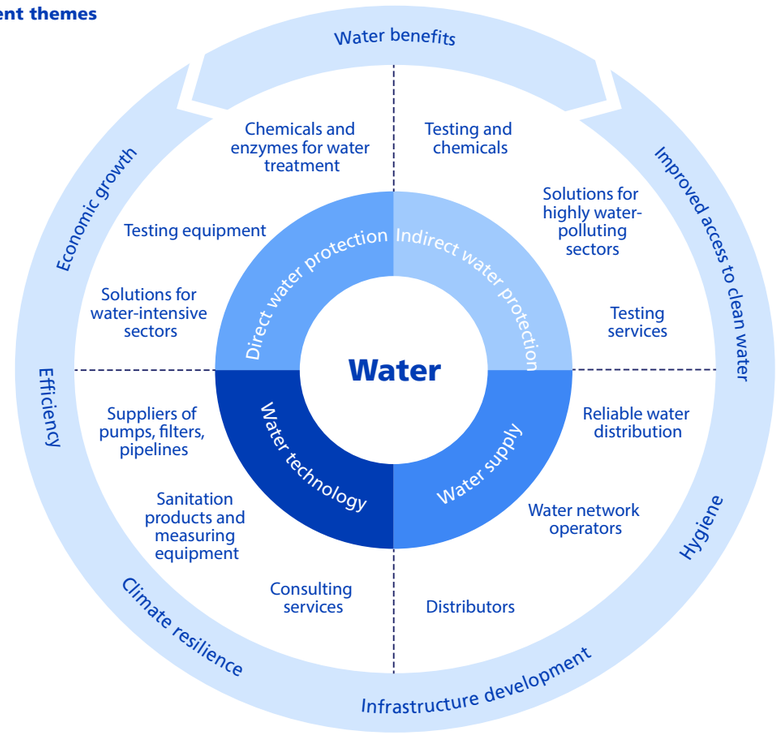
2 Water offers many interesting investment opportunities

Closing the water gap offers many attractive investment opportunities in the water sector. According to our estimates, the water sector as a whole is experiencing high annual growth of around **four to six percent**. This is significantly above the average global economic growth of around two to three percent. The water gap can only be reduced through more efficient water use and more effective water protection. This requires investment in the water sector in general and in its three investment themes of water technology, water supply and water protection in particular (see Figure 3). The water sector is also attractive because it should remain free from disruptive changes in the future. In addition, water is simply not substitutable in most applications, which further strengthens the defensive character of water as an asset class. Below, we explore the three investment topics mentioned:

Water technology
Climate change is changing the availability of usable surface water and threatening groundwater. Investments in new water technologies are therefore essential. The water technology sector encompasses a wide range of markets, ranging from infrastructure, piping, pumps, filters, smart water meters and grid monitoring technologies to dedicated software solutions. According to our estimates, market growth is around eight percent per year. Companies driving innovation in water technology include Valmont Industries, Xylem and Badger Meter.

Water supply
Water supply includes the expansion and operation of water infrastructure. In most regions of the world, water

Figure 3: Investment themes



Source: Zürcher Kantonalbank

supply is the public sector's responsibility. Market access is also associated with high investment costs and recurring fixed costs, which need to pay for themselves over a relatively long period of time. Both contribute to the fact that, based on our estimates, growth compared to water technology can be expected to be somewhat lower, at around four percent per year. Examples of companies include the US company American Water Works, UK-based United Utilities and SABESP, a Brazilian water utility.

Water protection

The third investment area can be divided into a direct and an indirect part. The direct part includes companies that develop and implement solutions to measure water quality and help make water usable for longer, for example through the development of chemicals. Indirect water protection is based on the "polluter pays" principle and offers preventive measures for particularly water-intensive and water-polluting industries. Overall, water protection is increasingly becoming a challenge in industrial countries as well as in developing and emerging countries. In this sub-sector, we expect an estimated annual growth rate of around seven percent. Examples of companies in this area are the Finnish chemical group Kemira or US manufacturers of testing equipment such as Thermo Fisher Scientific and Agilent.

The solutions for an efficient water supply can address both supply and demand. The aim is to decouple water consumption as far as possible from the increasing growth in population, economic development and prosperity, and to adapt the water supply to changing precipitation patterns (driven by climate change). In addition, solutions that increase the reusability of water are crucial. Filtration, the use of chemicals and enzymes, as well as testing equipment, are therefore necessary means to make more efficient use of the limited quantities of usable freshwater.

Companies offering solutions in these areas can also be grouped into one of the following three categories: Solution Providers, Adopters and Enablers (see Figure 4).

Figure 4: Global freshwater resources

Solution provider

Solution providers offer services or a combination of products and services to address water problems.

Core & Main

Distributor of water, sewage and fire safety products
Contribution to the theme of water: Core & Main sells water, wastewater and rainwater drainage products and associated services, thereby contributing to a better water infrastructure.

Other examples

American Waterworks **Stantec**

Adopter

Adopters take a leading role in introducing water policies and associated best practices in their operations.

Masco

Manufacturers of water equipment in the building sector
Contribution to the theme of water: Masco is committed to preserving natural water resources by considering water efficiency criteria in product design.

Other examples

Geberit

Enabler

Enablers provide tools, software and technology to address challenges in the area of water.

Pentair

Manufacturer of sustainable water solutions for a wide range of industries.
Contribution to the theme of water: Pentair offers a wide range of technologies, including in filtration and treatment. They serve all end markets (utilities, households and industry).

Other examples

Xylem **Thermo Fischer**

Source: Company information

Against this background, two very current challenges are discussed in the following chapters: firstly, water efficiency in agriculture and secondly, water quality threatened by "forever chemicals".

2.1 More water efficiency in agriculture

The agricultural sector accounts for a large proportion of water consumption. The potential for increasing water efficiency is correspondingly high here. Furthermore, in extreme cases, water shortages can trigger a food supply crisis. This makes investments in the efficient use and reliable availability of water all the more urgent.

There are many possible causes of water loss in agriculture. These include inefficient irrigation techniques, for example. Irrigating a large cultivated area is a complex task. There are a variety of watering techniques that vary depending on the type of crop. One of the most water-efficient technologies is drip irrigation, in which the water is directed straight to the roots of the plant. However, drip irrigation is often labour-intensive and involves high fixed costs. Plus, its use on large fields is difficult, as the irrigation system on the ground often affects agricultural machinery. Drip irrigation also cannot be used for all types of crops (e.g. not for grain).

This is another reason why pivot irrigation has become more important.[9] In the US, these irrigation systems can be recognised by the round shape of the crop fields. To ensure sustainable and water-efficient irrigation, it makes sense to supplement the pivots with digital applications that, for example, determine water requirements in detail. Weather data is used to avoid over- and under-irrigation. A planting concept adapted to the climate and soil conditions is also required. Companies that develop and offer such irrigation systems make a significant contribution to increasing water efficiency and ensuring food supply. For the pivot circular irrigation system, we expect annual growth of at least 15 percent on average over the next few years.

Other solutions include the increased collection and storage of precipitation, such as in artificially created water reservoirs, the use of covers over crop fields to minimise evaporation losses, innovative fertilisers that increase the water storage capacity of the soil, or the use of novel plant seeds that require less water.

Crop field with pivot irrigation

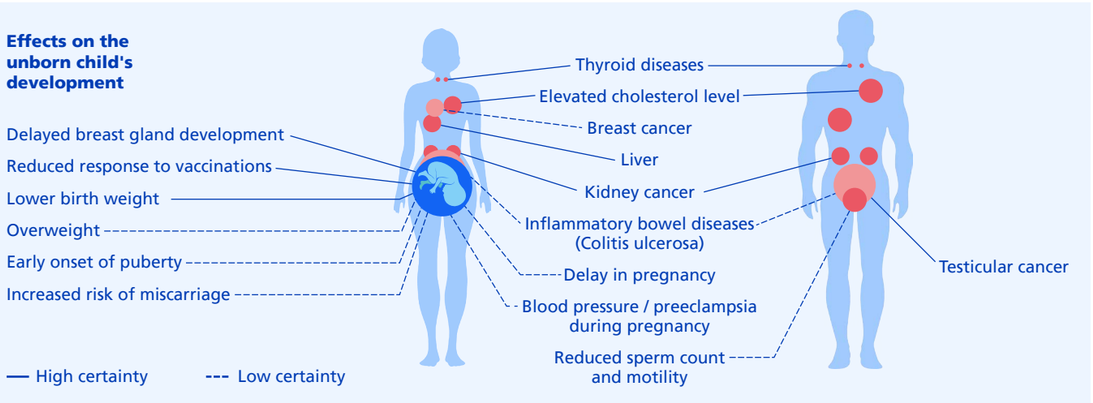
2.2 "Forever chemicals" require more water protection

An efficient water supply requires good water quality. However, water quality is increasingly affected by "forever chemicals" used in many industrially manufactured products. These chemicals belong to the group of PFAS (per- and polyfluoroalkyl substances). PFAS have beneficial properties, such as being grease and water repellent. PFAS are used, for example, in fire extinguishing foam, household appliances or in textile and leather processing to increase dirt and water resistance. The group of PFAS is estimated to include up to 15,000 different synthetic chemicals.[10] The most well-known PFAS are PFOS (perfluorooctanesulfonic acid) and PFOA (perfluorooctanoic acid). Both substances are used in the processing of plastics, for example.

PFAS have very high chemical and thermal stability. This due to the chemical compound consisting of fluorine and carbon. This compound can only be separated by very high temperatures. As a result, PFAS scarcely break down into natural and harmless substances, or only do so extremely slowly in nature. What makes things even more difficult is that decomposition by bacteria, light, air and water is also not possible.

[9] The Growing Importance of Center Pivot Irrigation in Today's Agriculture - Global Ag Tech Initiative
[10] Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) (nih.gov)

Figure 5: Effects of PFAS on the human organism



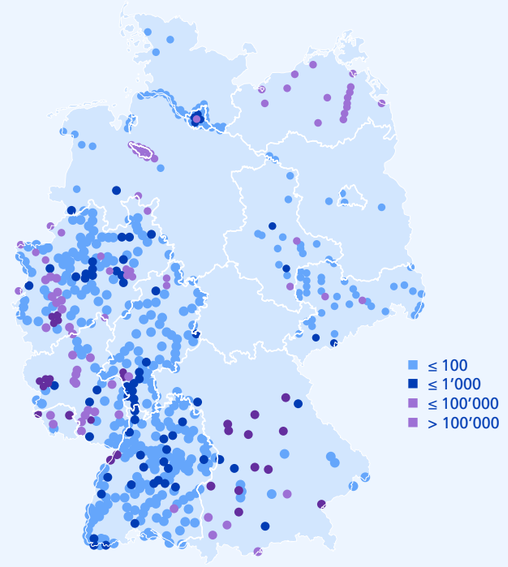
Source: MIT Technology Review, Statista

The widespread use of PFAS means that they enter the environment in various ways. This occurs through wastewater and exhaust air from industry, for example. Rain flushes the PFAS into waters or they contaminate the infiltration water, which ultimately reaches the groundwater. From the surface waters, the PFAS enter the atmosphere via evaporation, where they are then redistributed across the globe's surface through precipitation. PFAS can therefore also be found in freshwater and in agricultural products. PFAS enter human and animal organisms through the consumption of contaminated water. Since the PFAS molecules are not biodegradable, they accumulate in the organism over time.

The concentration of PFAS in the human organism is potentially hazardous to health. Studies indicate, for example, that some PFAS compounds may be associated with hormonal changes, cancers, thyroid dysfunction as well as reproductive and liver damage (see Figure 5).[11]
To minimise PFAS concentrations in freshwater and food, the regulation of emissions and the promotion of technologies for water treatment and removing of PFAS are essential. Currently, the most promising methods for eliminating PFAS contamination are the use of activated carbon filters as well as ion exchange and high-pressure membrane filtration.[12] Activated carbon filters are the most studied method of eliminating PFAS to date. Activated carbon is an effective adsorbent because it is a highly porous material with a large surface area. It is obtained from organic materials such as wood, lignite or hard coal.[13] However, there are still many uncertainties, for example regarding the absorption capacity of these filters, so cost estimates are still very difficult. Initial estimates suggest that the PFAS disposal market alone could grow from 1.8 billion US dollars in 2022 to 2.9 billion US dollars in 2031. This would equate to average annual growth of around five percent.[14] However, the US Defense Department publishes regular cost estimates (most recently in 2021), which suggest that the cost of decontaminating former defensive facilities in the US alone could amount to 31 billion US dollars.[15] Given the massive challenge, the above estimate of annual market growth of five percent is therefore rather conservative.

Regulatory development on PFAS in Switzerland and Europe
In Switzerland, the decision was taken in 2011 to regulate the use of PFOS and PFOA more strongly. Since then, this regulation has been repeatedly tightened. From 1 April 2024, the use of PFOS is completely prohibited in Switzerland.[16] Further restrictions or bans cannot be ruled out. In Germany, the new Drinking Water Ordinance was adopted in summer 2023. From 2026, the German federal government will impose a limit value for the concentration of a range of PFAS at 100 nanograms per litre of drinking water. From 2028, a limit of 20 nanograms per litre of drinking water will apply to the four most important PFAS (including PFOS and PFOA).[17] However, the level of pollution is currently much higher in Germany and in many places in Europe. In certain German regions, the target maximum value of 20 nanograms per litre of drinking water is already exceeded 5,000 times over (see Figure 6). In the US, much stricter limits of up to four nanograms are being discussed.

Figure 6: Proven PFAS exposure in nanograms per litre | Nanograms per kilogramme



Source: NDR, WDR and Süddeutsche Zeitung

In order to achieve a maximum value of 20 nanograms per litre, new technologies are needed that allow large volumes of water to be cleaned at a reasonable cost.

The regulation of PFAS has also gained momentum on the European stage. At the beginning of 2023, five major members of the European Union (Denmark, Germany, the Netherlands, Norway and Sweden) submitted a proposal to the European Chemicals Agency (ECHA) to widely restrict around 10,000 types of PFAS.[18]

[11] A review on the sources, occurrence and health risks of per-/poly-fluoroalkyl substances (PFAS) arising from the manufacture and disposal of electric and electronic products – ScienceDirect.
[12] Behaviour and fate of perfluoroalkyl and polyfluoroalkyl substances (PFASs) in drinking water treatment: A review – ScienceDirect
[13] For more information, see: Reducing PFAS in Drinking Water with Treatment Technologies | US EPA
[14] Polyfluoroalkyl Substances (PFAS) Waste Management Market Size, 2031 (transparencymarketresearch.com)
[15] The Pentagon's contamination time bomb: Cleanup backlog outpaces funding | Environmental Working Group (ewg.org)
[16] FOEN, Chemical Risk Reduction Ordinance, Annex 1.16; SR 814.81-Ordinance of 18 May 2005 on the reduction of risks when handling certain particularly hazardous substances, preparations and objects (Chemical Risk Reduction Ordinance, ChemRRV) (admin.ch)
[17] Regulations ensure the quality level of drinking water (bundesgesundheitsministerium.de)
[18] European Chemicals Agency (ECHA) publishes PFAS restriction proposal (echa.europa.eu)

3 Examples of innovative companies

Below are two companies that, due to their product offering, are in a good position to benefit from the structural growth of the water sector.

3.1 Valmont Industries Inc.

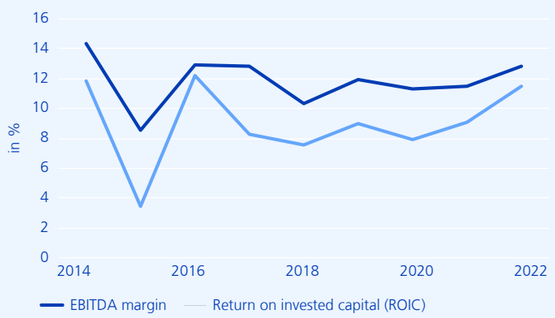
The US company Valmont is primarily active in the areas of infrastructure and agricultural technology. The company develops and produces structures made of steel, aluminium and glass-fibre reinforced plastics. Valmont is also a leader in metal coatings. The technologies are particularly important in terms of optimising water consumption in agriculture.

Valmont is the world's largest and leading provider of pivot irrigation systems and is also at the forefront of the development of smart, integrated irrigation solutions. The company therefore offers more than just irrigation systems. It also sells data analysis software solutions that provide farmers with data-driven decision-making tools. This allows irrigation to be optimised in terms of quantity and time. Sensors are increasingly being used to prevent under- and over-irrigation, for example. Valmont thus makes its greatest contributions to the following UN SDGs: 2 “Zero hunger”, 6 “Clean water and sanitation” and 9 “Industry, innovation and infrastructure”.

Figure 7: Company data on Valmont Industries Inc.

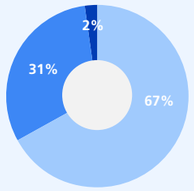
Market capitalisation:	USD 5.4 billion
Revenue (2022):	USD 4.35 billion
EBITDA (2022):	USD 556 million
R&D/Sales (2022):	1.1%
Employees:	~11,000

Profitability development from 2014 to 2022



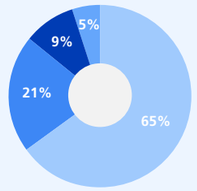
Business areas

Revenue



Geographical positioning

Revenue



Source: Bloomberg

3.2 Kemira Oyj

Kemira is a Finnish company specialising in the manufacture of chemical products and integrated systems for water-intensive industries. Customers include the pulp and paper industry as well as private and municipal water utilities in the area of water treatment. At Kemira, the water treatment segment is divided into three areas: drinking water treatment, wastewater management and dewatering of separated sludge.

Chemical drinking water treatment is an efficient solution for handling water as a valuable resource. Kemira's products help to clean water of impurities, reduce waste and emissions, and optimise the use of raw materials in customer processes. Renowned metropolitan regions of the world such as New York and Shanghai are among the company's customers. Drinking water treatment is challenging, as the water must be cleaned of a wide variety of different contaminants such as clay and sand particles, algae and microorganisms such as bacteria and viruses. One of Kemira's most efficient cleaning methods is flocculation through coagulation. In simplified terms, contaminants are extracted by changing the state of the aggregate.

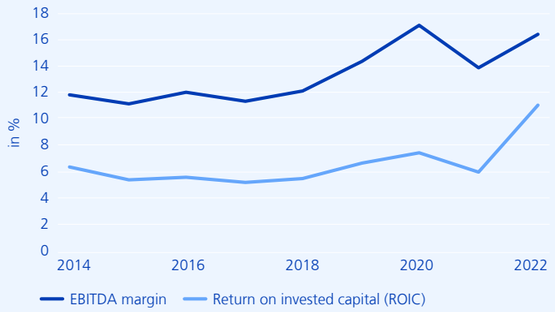
In the second area, wastewater management, the focus is even more on cost and energy efficiency, as the treatment of wastewater is often the responsibility of public authorities (municipalities). Energy and cost savings are possible with Kemira's chemical solutions for water purification. According to Kemira, coagulation can save up to 50 percent of energy compared to other solutions. What is particularly important in this context is the removal of phosphorus from wastewater, which can help prevent potential algae blooming in waters.[19] Kemira is also active in sludge dewatering, thereby promoting the preservation of freshwater in the water cycle.

The company has also developed packaging that does not contain PFAS. This makes an indirect contribution to water protection. Kemira contributes to the achievement of SDGs 6 “Clean water and sanitation”, 12 “Responsible consumption and production” and 14 “Life below water”.

Figure 8: Company data on Kemira Oyj

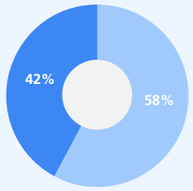
Market capitalisation:	EUR 2.3 billion
Revenue (2022):	EUR 3.57 billion
EBITDA (2022):	EUR 586 million
R&D/Sales (2022):	0.9%
Employees:	~5,000

Profitability development from 2014 to 2022



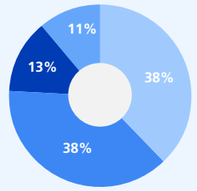
Business areas

Revenue



Geographical positioning

Revenue



Source: Bloomberg

[19] An algae bloom can have devastating effects on limnic and marine ecosystems. See example below: Risiko Algenblüte – In den Schweizer Seen schlummert die Gefahr – Wissen – SRF

4 Conclusion

Water is an exciting investment theme in the short and long term

The global demand for water is increasing continuously, driven by population growth and increase in prosperity. At the same time, climate change and pollution tend to lower the availability of usable surface water. Groundwater can compensate for some of this, but only to the degree that it remains sustainably available in the long term. What exacerbates the situation is that as the sea level rises – due to the progressive melting of the polar ice caps and the mountain glaciers – the risk of groundwater reserves salinating also increases. Companies that offer solutions in the areas of water technology, water supply and water protection promote the more efficient handling of freshwater as a non-substitutable resource. They are well positioned to benefit disproportionately from structural demand growth for freshwater and from investments in water efficiency and water protection. Given the size of the challenge, the issue of water will continue to occupy humanity for a very long time to come.